

Appl. No. 09/667,596  
2658-0190P  
Page 17

**REMARKS**

Claims 1-46 are pending in the present application. Claims 1, 21, 23, 32, 33, 34, 35, 36, 41, 42, 43, 44, 45 and 46 are independent claims. Claims 1, 9, 18, 21 and 23 are amended by this Reply. New claims 32-46 are added.

**NEW CLAIMS AND ALLOWABLE SUBJECT MATTER**

The Applicant appreciates the Examiner's indication that claims 3-6, 11, 12, 14, 15, 19, 10, 25 and 26 contain allowable subject matter.

The Examiner states that claims 3-6, 11, 12, 14, 15, 19, 10, 25 and 26 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 3-6, 11, 12, 14, 15, 19, 10, 25 and 26 have been retained, since it is believed that independent claims 1, 21 and 23, from which these claims depend, are allowable.

However, new claims 32- 46 have been added to recite the objected-to-allowable subject matter of claims 3-6, 11, 12, 14, 15, 19, 10, 25 and 26, including all of the limitations of the base claim and any intervening claims.

Particularly, new independent claim 32 recites objected-to-allowable subject matter of claim 3, including the limitations of base claim 1 and intervening claim 2.

New independent claim 33 recites objected-to-allowable subject matter of claims 4 and 6, including the limitations of base claim 1.

Appl. No. 09/667,596  
2658-0190P  
Page 18

New independent claim 34 recites objected-to-allowable subject matter of claims 5 and 6, including the limitations of base claim 1.

New independent claim 35 recites objected-to-allowable subject matter of claim 11, including the limitations of intervening claims 7 and 8 and base claim 1. New claims 37 and 38 depend from claim 35.

New independent claim 36 recites objected-to-allowable subject matter of claim 12, including the limitations of intervening claims 7 and 8 and base claim 1. New claims 39 and 40 depend from claim 36.

New independent claim 41 recites objected-to-allowable subject matter of claim 14, including the limitations of intervening claims 7 and 13 and base claim 1.

New independent claim 42 recites objected-to-allowable subject matter of claim 15, including the limitations of intervening claims 7 and 13 and base claim 1.

New independent claim 43 recites objected-to-allowable subject matter of claim 20, including the limitations of intervening claim 16 and base claim 1.

New independent claim 44 recites objected-to-allowable subject matter of claim 19, including the limitations of intervening claims 16 and 17, and base claim 1.

New independent claim 45 recites objected-to-allowable subject matter of claim 25, including the limitations of base claim 23.

Appl. No. 09/667,596  
2658-0190P  
Page 19

New independent claim 46 recites objected-to-allowable subject matter of claim 26, including the limitations of base claim 23.

Applicants submit that these new claims are allowable. Allowance of the claims is solicited in earnest.

#### **OBJECTIONS TO DRAWINGS**

The drawings stand objected to under 37 CFR 1.83(a) as not showing every feature of the invention specified in the claims.

##### **Claim 9**

The Examiner requires that the recited feature of Claim 9, "wherein the drain electrode part has a smaller area than if the drain electrode part was electrically connected to the pixel electrode via a contact hole in the protective layer over the drain electrode" must be shown in the drawing or the feature must canceled from the claim.

The Examiner asserts that the drawings show that the drain electrode part has a greater (rather than smaller) area than if the drain electrode part was electrically connected to the pixel electrode via a contact hole in the protective layer over the drain electrode. Claim 9 has been amended to coincide with the drawing, thus eliminating the need for an amendment to the drawings.

Appl. No. 09/667,596  
2658-0190P  
Page 20

Accordingly, Applicants respectfully request withdrawal of the Examiner's objection.

Claim 18

The Examiner objected to the drawings requiring that the recited feature of claim 18, "the pixel electrode overlaps a gate lines less than if the protective layer included a contact hole over a storage electrode part of the metallic pattern" must be shown or canceled from the claim.

Applicant conducted a telephonic interview with the Examiner on March 4, 2002 to discuss the drawings relative to this claimed feature. The Examiner acknowledged that the claimed feature is shown in the drawing, but stated that the feature is not shown with sufficient clarity. Applicant agreed to submit a Drawing Correction Authorization Request (DCAR), proposing changes to the drawings to identify the boundaries of the pixel electrode in a manner such that the extent of overlap/non-overlap of the gate lines is readily apparent. A DCAR is submitted herewith. Applicant has designated the overlapping edge of the pixel electrode as 28A in Figures 2 and 3 and amended to specification accordingly. Withdrawal of the objection is respectfully requested.

Appl. No. 09/667,596  
2658-0190P  
Page 21

Claim 21

The Examiner requires that the recited feature, "a thin film transistor selectively electrically connecting one of the data lines to the pixel electrode" and "storage capacitor having a storage electrode electrically connected to the drain electrode and the pixel electrode" in claim 21 must be shown or must be canceled from the claim.

Applicant submits that the thin film transistor, identified by reference numeral 30, is shown in the drawing. The TFT consists of source, drain and gate electrodes meeting the requirement for definition as a transistor. For example, figure 2 shows a thin film transistor (TFT) that includes a source electrode (34) protruding from data line (26). The TFT has a gate electrode (32) protruding from gate line (24), and a drain electrode (36A). The drain electrode is part of the same continuous pattern as storage electrode part (36B).

Applicant submits that electrical connectivity does not mean that there is a direct short, for example, a short between source and drain in a manner causing a device not to function. If this were so, the gates in every transistor would establish a short between the source and drain.

In each of the drawings, the drain electrode (part of the TFT) establishes an electrical connection, connecting that portion of the transistor with the pixel electrode. Note that a connection with the pixel electrode can be made via a contact hole at either the storage electrode part or at the drain electrode part of

Appl. No. 09/667,596

2658-0190P

Page 22

the metallic pattern, because they each form a part of the same continuous pattern.

Similarly, source electrode 34, also part of the TFT, establishes a connection between the TFT and the data line. Source electrode 34, and drain electrode 36A (in FIG. 2) are each connected to gate electrode 32.

Therefore, the TFT does in fact electrically connect the data line to the pixel electrode, and this is clearly shown in the drawing. However, connectivity, in this case, should not be construed as a direct short between the source and drain, causing the device not to function. Current flow in a transistor depends on many factors. Accordingly, reconsideration and withdrawal of the Examiner's objection is respectfully requested.

Likewise, the storage capacitor of claim 21 is also shown in the drawing, and is designated by reference numeral 38. Drain electrode pattern 36 (in FIG. 2), is one continuous pattern. Drain electrode part 36A and storage electrode part 36B are also part of the one continuous pattern or layer. Since this one continuous layer 36 includes storage electrode part 36B, and drain electrode part 36A, the drain electrode part 36A is as much a part of capacitor 38 as is the storage electrode part 36B. Thus, it is valid to say that the storage capacitor has a storage electrode and a drain electrode.

In each embodiment, either the storage electrode part or the drain electrode part is connected to the pixel electrode (via a contact hole). Note that a connection

Appl. No. 09/667,596  
2658-0190P  
Page 23

at either point is sufficient to connect the capacitor to the pixel electrode because there is continuity between both electrode parts because of the metallic pattern. Because of the connection at the contact hole, it is also valid to say that the storage capacitor, storage electrode or drain electrode is connected to the pixel electrode.

Applicant submits that the claimed feature, as described above, is show in the drawings. Nevertheless, claim 21 has been amended to recite a thin film transistor, **interposed between** one of the data lines and the pixel electrode and including a source electrode connected to the one of the data lines, a gate electrode connected to one of the gate lines a drain electrode, and a storage capacitor having a storage electrode and a drain electrode **at the same node**, the storage capacitor being connected to the pixel electrode. Accordingly reconsideration and withdrawal of the objection is respectfully requested.

#### **REJECTIONS UNDER 35 U.S.C. §112**

##### **Claim 9**

Claim 9 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. This rejection is respectfully traversed.

Appl. No. 09/667,596  
2658-0190P  
Page 24

In rejecting claim 9, the Examiner asserted that the claim language contradicted the specification in reciting "wherein the drain electrode part has a smaller area than if the drain electrode part was electrically connected to the pixel electrode via a contact hole in the protective layer over the drain electrode." In response, the Applicant has amended claim 9 to recite the claimed feature consistent with the specification. Reconsideration and withdrawal if the rejection is respectfully requested.

Claim 21

Claim 21 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. This rejection is respectfully traversed.

In rejecting claim 21, the Examiner asserts that the claim language, as recited, describes the source electrode and drain electrode as both being connected to the pixel electrode, and accordingly will be short-circuited. As argued above extensively, with respect to the Examiner's objection to the drawings, the source and drain electrodes are not both connected directly to the pixel electrode. While the source and drain electrodes are part of the same transistor (TFT 30), only the drain electrode portion is connected directly to the pixel electrode. A



Appl. No. 09/667,596  
2658-0190P  
Page 25

transistor connected to two separate nodes does not create a short-circuit between the nodes.

Claim 21 recites "a thin film transistor selectively electrically connecting one of the data lines to the pixel electrode." Read together with the drawings, it is clearly seen that the TFT makes a connection with data line 26 (through source electrode 24), and also makes a connection with the pixel electrode 28 (via the drain electrode pattern 36 in FIG. 2). Therefore the TFT does in fact selectively electrically connect one of the data lines to the pixel electrode.

Similarly, as argued above with respect to the Examiner's objection to the drawings, the storage capacitor does in fact have both a storage electrode and a drain electrode. This is possible because both the storage electrode and the drain electrode are parts of one continuous metallic pattern. They form the same node. Therefore claim 21 is not indefinite for the reasons asserted by the Examiner.

Nevertheless, claim 21 has been amended to recite a thin film transistor, **interposed between** one of the data lines and the pixel electrode and including a source electrode connected to the one of the data lines, a gate electrode connected to one of the gate lines a drain electrode, and a storage capacitor having a storage electrode and a drain electrode **at the same node**, the storage capacitor being connected to the pixel electrode. Accordingly, reconsideration

Appl. No. 09/667,596  
2658-0190P  
Page 26

and withdrawal of the rejection under 35 U.S.C. §112, second paragraph, is respectfully requested.

Claim 28

Claim 28 stands rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. This rejection is respectfully traversed.

In rejecting claim 28, the Examiner asserts that the claim language, as recited, renders the device as non-functional in that there is no connection between the pixel electrode and the drain electrode. Using Figure 2 as an example, Applicants request that the Examiner note that the protective layer does not have a contact hole exposing the drain electrode part (36A) of the metallic pattern. This however, does not preclude connection between the pixel electrode and the drain electrode. The reason is that the protective layer forms one continuous layer that also includes the storage electrode part, and the drain electrode part is connected to the pixel electrode at contact hole 40 at the storage electrode part.

Appl. No. 09/667,596  
2658-0190P  
Page 27

Claim 31

Claim 31 stands rejected on similar grounds. With regard to the rejection of claim 31, using FIG. 3 as an example, the storage electrode, while having no contact hole, is nevertheless connected to the pixel electrode. This is because the protective pattern forms one continuous layer that includes the drain electrode part. Therefore the storage electrode part is connected to the pixel electrode because the drain electrode part is connected to the pixel electrode at contact hole 44.

Accordingly, reconsideration and withdrawal of the rejection of claim 28 and claim 31 under 35 U.S.C. §112, first paragraph, is respectfully requested.

**REJECTIONS UNDER 35 U.S.C. §102**

Claims 1, 2, 7-10, 13, 16-18, 21-23 and 27-31 stand rejected under 35 U.S.C. §102(e) over U.S. Patent No. 5,982,467 to Lee, for the reasons set forth on pages 5-8 of the Office Action. This rejection is respectfully traversed.

The Examiner asserts that Lee (FIG. D) discloses a metallic pattern, having a drain electrode 137 of a thin film transistor, and a storage electrode 119 of a storage capacitor, as set forth in Col. 6, lines 14-15. While the cited reference indicates that a chromium alloy is deposited on the insulating layer, and that it is patterned by using a fourth mask to form source electrodes 127, drain electrodes 137, and storage electrodes 119, these result only after removing the

Appl. No. 09/667,596  
2658-0190P  
Page 28

unwanted portions of the deposited alloy (see FIGS. 4D, 4E and 4F). It is clear from these figures, that after patterning, the storage electrodes 119 and drain electrodes 137 do not share a common node.

Therefore Lee does not disclose a metallic pattern forming a drain electrode of the thin film transistor and a storage electrode of the storage capacitor at the same node, as recited in independent claim 1 (as amended) and similarly stated in independent claims 21 and 23 (as amended).

Claims 2, 7-10, 13, 16-18, 22 and 27-31 depend from claims 1, 21 and 23, either directly or indirectly, therefore are patentable at least for the reasons stated with respect to independent claims 1, 21 and 23. Reconsideration and withdrawal of this art grounds of rejection is respectfully requested.

#### **REJECTIONS UNDER 35 U.S.C. §103**

Claims 2 and 24 stand rejected under 35 U.S.C. §103(a) over Lee as applied to claims 1 and 23 above, and further in view of U.S. Patent No. 6,100,953A to Kim et al. (Kim). This rejection is respectfully traversed.

The Examiner asserts that Kim discloses a metallic pattern having a drain electrode of a thin film transistor and a storage electrode wherein the metallic pattern is spaced a predetermined distance from the data line.

Kim, however, like Lee (argued above with respect to claims 1, 21 and 23), does disclose or suggest a metallic pattern forming a drain electrode of the thin

Appl. No. 09/667,596  
2658-0190P  
Page 29

film transistor and a storage electrode of the storage capacitor at the same node, as recited in independent claim 1 (as amended) and similarly stated in independent claims 21 and 23 (as amended).

Claims 2 and 24 depend on claims 1 and 23, either directly or indirectly. Therefore Lee, in view of Kim, cannot render claims 2 and 24 obvious to one of ordinary skill in the art. Accordingly, reconsideration and withdrawal of this art grounds of rejection is respectfully requested.

#### **CONCLUSION**

Applicants point out that all of the Examiner's comments have been addressed and that all of the Examiner's objections and rejections have been overcome, thereby placing all claims pending in the present Application in condition for allowance. Allowance of the claims is respectfully solicited.

In the event that any outstanding matters remain in this application, Applicant requests that the Examiner contact Percy L. Square at (703) 205-8034 to discuss such matters.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

Appl. No. 09/667,596

2658-0190P

Page 30

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH &amp; BIRCH, LLP

By \_\_\_\_\_

Joseph A. Kolasch

Reg. No. 22,463

JAK/PLS/asc  
2658-0190PP.O. Box 747  
Falls Church, VA 22040-0747  
(703) 205-8000

Attachment: Version with Markings to Show Changes Made

(Rev. 02/06/01)

Appl. No. 09/667,596

2658-0190P

Page 31

**VERSION WITH MARKINGS TO SHOW CHANGES MADE****IN THE SPECIFICATION**

The paragraph on page 8, line 6 and ending on page 9, line 2 has been replaced with the following rewritten paragraph.

--Referring to Fig. 3, there is shown an electrode arrangement of a thin film transistor substrate in a liquid crystal display according to a second embodiment of the present invention. When compared with the thin film transistor shown in Fig. 2, the thin film transistor substrate of Fig. 3 has the same constructional elements except that the drain electrode pattern 42 is electrically connected via a contact hole 44 to the pixel electrode 28 at a drain electrode part 42A. Accordingly, the contact hole for connecting the pixel electrode 28 to storage electrode part 42B is eliminated to reduce an amount of overlap between the storage electrode part 42B and the pixel electrode 28. Note also in Fig. 3 that pixel electrode 28 overlaps gate line 24, the edge of pixel electrode 28 designated by reference 28A, and contrast FIG. 2 in which pixel edge 28A overlaps the gate line more than in Fig. 3. The contact hole for connecting the pixel electrode 28 to storage electrode part 42B is eliminated in Fig. 3. --

**IN THE CLAIMS:**

The claims have been amended as follows:

1. (Twice Amended) A liquid crystal device having a thin film transistor, comprising:

a plurality of gate lines formed on a substrate;

a plurality of data lines insulated from and intersecting said gate lines, said data lines and intersecting gate lines defining a plurality of cells, at least one cell including,

a pixel electrode,

Appl. No. 09/667,596  
2658-0190P  
Page 32

a thin film transistor connected to one of the data lines and one of the gate lines defining the cell,  
a storage capacitor, and  
a metallic pattern forming a drain electrode of the thin film transistor and a storage electrode of the storage capacitor at the same node, and being electrically connected to the pixel electrode.

9. (Twice Amended) The liquid crystal device of claim 8, wherein the drain electrode part has a [smaller] greater area than [if the] a drain electrode part [was] electrically connected to the pixel electrode via a contact hole in the protective layer over the drain electrode part.

18. (Twice Amended) The liquid crystal device of claim 17, wherein the pixel electrode overlaps a gate line, defining the cell but not connected to the thin film transistor, the overlap of the gate line being less than an overlap in a case wherein [if] the protective layer [included] includes a contact hole over a storage electrode part of the metallic pattern.

21. (Twice Amended) A liquid crystal device having a thin film transistor, comprising:

a plurality of gate lines formed on a substrate;  
a plurality of data lines insulated from and intersecting said gate lines, said data lines and intersecting gate lines defining a plurality of cells, at least one cell including,  
a pixel electrode,  
a thin film transistor [selectively electrically connecting] interposed between one of the data lines [to] and the pixel electrode and including a



Appl. No. 09/667,596

2658-0190P

Page 33

source electrode connected to the one of the data lines, a gate electrode connected to one of the gate lines, [and] a drain electrode, and

a storage capacitor having a storage electrode and a drain electrode at the same node, the storage capacitor being connected to the pixel electrode.

23. (Twice amended) A method of manufacturing a thin film transistor substrate, comprising:

- forming a gate line having a gate electrode on a transparent substrate;
- forming a gate insulating layer on the gate electrode;
- forming a semiconductor layer on the gate insulating layer;
- forming a data line having a source electrode, and a metallic pattern having a drain electrode part and a storage electrode part at the same node;
- forming a semiconductor layer over at least a portion of one of the gate electrodes, at least a portion of one of the source electrode, and at least a portion of the drain electrode part;
- forming a protective film over the entire surface; and
- forming a pixel electrode over the protective film.

New claims 32-46 have been added.

PATENT  
2658-0190P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: In Duk SONG et al. Conf.:  
Appl. No.: 09/667,596 Group: 2871  
Filed: September 22, 2000 Examiner: H. Nguyen  
For: THIN FILM TRANSISTOR SUBSTRATE OF  
LIQUID CRYSTAL DISPLAY AND METHOD OF  
MANUFACTURE

DRAWING CORRECTION AUTHORIZATION REQUEST

Assistant Commissioner for Patents  
Washington, DC 20231

April 17, 2002

Sir:

Subject to the approval of the Examiner, Figs. 2 and 3 will be amended to as indicated in red on the attached photocopies thereof.

In particular, reference numeral 28A and its associated lead line will be added to Figs. 2 and 3, and the boundaries of the pixel electrode will be clarified such that the extend of overlap/non-overlap of the gate lines is readily apparent.

It is respectfully requested that these proposed drawing corrections be approved and that all drawing objections be withdrawn.

Appl. No. 09/667,596

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH &amp; BIRCH, LLP

By \_\_\_\_\_

Joseph A. Kolasch, #22,463

P.O. Box 747  
Falls Church, VA 22040-0747  
(703) 205-8000

JAK/PLS/asc  
2658-0190P

Attachments



FIG. 3

